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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,000	08/18/2006	Alexander Apolonski	P/1903-28	5129

2352 7590 03/05/2010
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EXAMINER	
HAGAN, SEAN P	

ART UNIT	PAPER NUMBER
2828	

MAIL DATE	DELIVERY MODE
03/05/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/579,000	APOLONSKI ET AL.	
	Examiner	Art Unit	
	SEAN HAGAN	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12 and 14-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12 and 14-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *17 December 2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1 through 11 originally filed 11 May 2006. Claims 1 through 11 amended by amendment received 11 May 2006. Claims 1 through 11 cancelled by amendment received 14 January 2008. Claims 12 through 20 added by amendment received 14 January 2008. Claim 13 cancelled by amendment received 3 October 2008. Claim 21 added by amendment received 3 October 2008. Claims 12, 14, 15, 17, and 18 amended by amendment received 3 October 2008. Claims 12 and 14 amended by amendment received 17 April 2009. Claim 12 amended by amendment received 17 December 2009. Claims 22 and 23 added by amendment received 17 December 2009. Claims 12 and 14 through 23 are pending in this application.

Response to Arguments

2. Applicant's arguments have been fully considered; they are not persuasive.

3. Applicants argue that the disclosure of Proctor et al. ("Characterization of a Kerr-lens mode-locked Ti:sapphire laser with positive group-velocity dispersion" Opt. Lett. 18, 1654-1656 (1993), hereafter Proctor) is not applicable to the other cited art because of the disparity in operating power levels. Applicants argue that Proctor is a low energy system whereas the other cited art is high energy. Examiner notes that the energy of the pulses in Proctor does not appear to be disclosed and can not find support for applicant's statement that Proctor exclusively operates a low energy system within Proctor. Examiner acknowledges that Kalashnikov et al. ("Approaching the microjule

frontier with femtosecond laser oscillators: theory and comparison with experiment", New Journal of Physics, 7 (2005) 217,pp. 1-16, hereinafter Kalashnikov) discloses that at greater than 200nJ is mainly destabilized by explosive instability caused by the absence of self-amplitude modulation saturation whereas for pulses at 10-20nJ the stability can be provided by a number of other methods. However, this disclosure does not appear to speak directly of the lower ends of the claimed range which starts at 100nJ. As demonstrated by Cho et al. ("Generation of 90-nJ pulses with a 4-MHz repetition-rate Kerr-lens mode-locked Ti:Al_2O_3 laser operating with net positive and negative intracavity dispersion," Opt. Lett. 26, 560-562 (2001), hereafter Cho), operation may be achieved at 109nJ with net intracavity dispersion of +390fs^2. Section 3.1 of Kalashnikov appears to indicate that high energy fails in the model under discussion, but does not indicate that an increase in positive dispersion would increase the valid operational energy, so the successful operation of Cho appears to be outside of the model proposed by Kalashnikov.

4. With respect to the combination of Cho and Proctor, examiner's position is that since positive dispersion is a factor in the successful operation of these devices, the indication of the trends caused by lower positive dispersion within Proctor would render it obvious to try a lower positive dispersion within Cho in an effort to duplicate those trends in high energy pulses. Kalashnikov appears to indicate that further factors relating to loss and gain become apparent at high energy, but the affect of positive dispersion on these factors is not clear from Kalashnikov and do not appear to support an argument that teachings related to variation of positive dispersion in low energy

systems are wholly inapplicable to high energy systems alone. As such, examiner maintains combination of Cho and Proctor given the evidence presented.

5. As such, all claims are addressed as follows:

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 12, 22, and 23 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

8. ***Regarding claim 12,*** "Generating laser pulses having an energy of at least 100nJ" is not taught by the present disclosure in that no part of the present disclosure clearly states that any embodiment of the invention could or does generate laser pulses having an energy of at least 100nJ. There does appear to be clear disclosure of operation over 200nJ, however this leaves operation of the range between 100nJ and 200nJ undisclosed and can not be used to support this limitation of claim 12.

9. ***Regarding claim 22,*** "Wherein a bandwidth of a laser pulse is >180nm" is not taught by the present disclosure. The present disclosure indicates that the width of the band achievable with a positive dispersion according to the prior art is 180nm and that the band has a greater width using mirrors according to the present invention, however this is not the bandwidth of a laser pulse since no single pulse is generated for the entire width of valid configurations. It appears that this claim was intended to detail what is recited in the specification so examiner will address the claim under that assumption, however the actual claim language used details a different situation which is not supported by the specification presented.

10. ***Regarding claim 23,*** "Wherein the laser pulses have an energy between 100nJ and 1μJ" is not taught by the present disclosure for the same reason that the above limitation of claim 12 is determined to not be taught by the present disclosure.

Claim Rejections - 35 USC § 103

11. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

12. Claims 12, 14, 15, 16, 18, 19, 20, 21, 22, and 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Cho in view of Szipocs et al. (Szipocs, US Patent 5,734,503) and further in view of Proctor.

13. ***Regarding claim 12,*** Cho discloses, "A resonator comprising resonator components including a laser crystal" (Fig. 1). "A plurality of mirrors including a pump beam coupling-in mirror" (Fig. 1). "A laser beam out-coupling mirror and a multiple reflection telescope for enlarging the resonator length" (Fig. 1). "A first set of the resonator components having a positive group delay dispersion" (pg. 561, col. 2, starting "Using positive dispersion mode locking..."). "Said resonator in operation having a positive net averaged group delay dispersion over an operating wavelength range" (pg. 561, col. 2, starting "Using positive dispersion mode locking..."). "Generating laser pulses having an energy of at least 100nJ" (pg. 561, col. 2, starting "Using positive dispersion mode locking..."). Cho does not disclose, "Said plurality of mirrors including dispersive mirrors with a negative group delay dispersion for compensating in part the positive group delay dispersion of the first set of the resonator components." Szipocs discloses, "Said plurality of mirrors including dispersive mirrors with a negative group delay dispersion for compensating in part the positive group delay dispersion of the first set of the resonator components" (col. 3, lines 51-65). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cho with the teachings of Szipocs. The use of dispersive mirrors as disclosed by Szipocs would enhance the teachings of Cho by introducing more stable dispersive elements (Szipocs, col. 3, lines 51-65).

14. The combination of Cho and Szipocs does not disclose, "Wherein the positive net averaged group delay dispersion of the resonator is in a range between 0 and 100 fs^2." Proctor discloses, "Wherein the positive net averaged group delay dispersion of the

resonator is in a range between 0 and 100 fs^2" (pg. 1655, col. 1, starting "Spectrum a in Fig. 1..."). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Cho and Szipocs with the teachings of Proctor. Operation within the ranges disclosed by Proctor would enhance the teachings of Cho and Szipocs by providing information on what bandwidths are available through positive dispersion and, thus, introduce operational parameters not otherwise available. (Proctor, Fig. 1)

15. ***Regarding claim 14,*** the combination of Cho and Szipocs does not disclose, "Wherein the positive net averaged group delay dispersion is <50 fs^2." Proctor discloses, "Wherein the positive net averaged group delay dispersion is <50 fs^2" (pg. 1655, col. 1, starting "Spectrum a in Fig. 1..."). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Cho and Szipocs with the teachings of Proctor for the reasons given above regarding claim 1.

16. ***Regarding claim 15,*** Cho does not disclose, "Wherein the multiple reflection telescope comprises at least one of the dispersive mirrors with the negative dispersion." Szipocs discloses, "Wherein the multiple reflection telescope comprises at least one of the dispersive mirrors with the negative dispersion" (col. 3, lines 51-65). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the

teachings of Cho with the teachings of Szipocs for the reasons given above regarding claim 1.

17. ***Regarding claim 16,*** Cho does not disclose, "Wherein all the mirrors of the resonator are the dispersive mirrors with the negative dispersion." Szipocs discloses, "Wherein all the mirrors of the resonator are the dispersive mirrors with the negative dispersion" (col. 3, lines 51-65). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cho with the teachings of Szipocs for the reasons given above regarding claim 1.

18. ***Regarding claim 18,*** Cho discloses, "Wherein the laser arrangement is configured to provide passive mode-locking" (pg. 560, col. 1, starting "In this Letter…").

19. ***Regarding claim 19,*** Cho discloses, "Wherein a Kerr-lens mode-locking principle is used for the passive mode-locking" (pg. 560, col. 1, starting "In this Letter…").

20. ***Regarding claim 20,*** Cho discloses, "A saturable absorber positioned and configured to perform the passive mode-locking" (pg. 560, col. 1, starting "In this Letter…").

21. ***Regarding claim 21,*** Cho does not disclose, "Wherein an entirety of the negative dispersion of the resonator is determined only by the dispersive mirrors with the

negative dispersion." Szipocs discloses, "Wherein an entirety of the negative dispersion of the resonator is determined only by the dispersive mirrors with the negative dispersion" (col. 5, lines 12-16). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cho with the teachings of Szipocs for the reasons given above regarding claim 1.

22. ***Regarding claim 22,*** Cho does not disclose, "Wherein a bandwidth of a laser pulse is >180nm." Szipocs discloses, "Wherein a bandwidth of a laser pulse is >180nm" (col. 3, lines 51-65). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Cho with the teachings of Szipocs for the reasons given above regarding claim 1.

23. ***Regarding claim 23,*** Cho discloses, "Wherein the laser pulses have an energy between 100nJ and 1μJ" (pg. 561, col. 2, starting "Using positive dispersion mode locking…").

24. Claim 17 rejected under 35 U.S.C. 103(a) as being unpatentable over Cho in view of Szipocs in view of Proctor and further in view of Cunningham et al. (Cunningham, US Patent 5,701,327).

25. ***Regarding claim 17,*** the combination of Cho, Szipocs, and Proctor does not disclose, "The resonator comprising a pair of glass wedges with positive dispersion

configured to provide a supplementary dispersion fine adjustment." Cunningham discloses, "The resonator comprising a pair of glass wedges with positive dispersion configured to provide a supplementary dispersion fine adjustment" (col. 6, lines 42-44). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Cho, Szipocs, and Proctor with the teachings of Cunningham. Inclusion of wedges for fine tuning pulse characteristics as taught by Cunningham would enhance the teachings of Cho and Szipocs by allowing for introduction of minute alterations of dispersion should such alterations present themselves as necessary.

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN HAGAN whose telephone number is (571)270-1242. The examiner can normally be reached on Monday-Friday 7:30 - 5:00.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. H./
Examiner, Art Unit 2828

/Minsun Harvey/
Supervisory Patent Examiner, Art Unit 2828